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Enterprise Management in the U.S. Army Medical Command

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14. ABSTRACT
The evolution of automation in business has grown to the point where centralized remote management of information technology (IT) is a necessary technique to support the business processes of an organization. The U.S. Army Medical Command (MEDCOM) manages its computer networks in a decentralized manner. Having isolated islands of technology at the separate MEDCOM agencies prohibits the central management of networked hardware and software assets. This decentralized arrangement creates expensive redundancies, contributes to the lack of standards, and provides limited asset visibility. The limited visibility enhances security risks, restricts proactive planning, and contributes to high costs.
Available Enterprise Management (EM) technology facilitates the centralized management of networked assets. The MEDCOM EM plan is to establish standards and tools that will focus on software distribution, asset management, system health monitoring, and a centralized help desk. Despite more than $200 million spent annually on Information Management/Information Technology.

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Abstract

The evolution of automation in business has grown to the point where centralized remote management of information technology (IT) is a necessary technique to support the business processes of an organization. The U.S. Army Medical Command (MEDCOM) manages its computer networks in a decentralized manner. Having isolated islands of technology at the separate MEDCOM agencies prohibits the central management of networked hardware and software assets. This decentralized arrangement creates expensive redundancies, contributes to the lack of standards, and provides limited asset visibility. The limited visibility enhances security risks, restricts proactive planning, and contributes to high costs.

Available Enterprise Management (EM) technology facilitates the centralized management of networked assets. The MEDCOM EM plan is to establish standards and tools that will focus on software distribution, asset management, system health monitoring, and a centralized help desk. Despite more than $200 million spent annually on Information Management/Information Technology, the MEDCOM does not currently have an automation environment where leaders have visibility of IT assets and the ability to proactively plan at the enterprise level. Strategic vision is necessary to appreciate the potential of EM and the full implementation of EM may require a policy directive.

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Introduction

The purpose of this paper is to examine the impact enterprise management (EM) will have on information technology (IT) in the U.S. Army Medical Command (MEDCOM) of the U.S. Army Medical Department (AMEDD). The MEDCOM is organized into separate, distinct medical regions and facilities spanning the continental United States (U.S.) and selected parts of the world. While these Medical Treatment Facilities (MTFs) and Medical Centers (MEDCENs) provide medical care to distinct beneficiary populations, they all follow similar business processes that are guided through AMEDD central policy and strategic management planning. The evolution of IT over the last two decades and its implementation within the MEDCOM has given rise to expanding support, capabilities, and costs that can only now be addressed through EM and administration. Currently, MTF and MEDCEN commands manage their Local Area Networks (LANs). While there has been regional coordination and some enterprise coordination of automation initiatives, comprehensive EM of the MEDCOM's automation resources does not currently exist.

This paper will examine the impact of EM on IT in the MEDCOM by first providing a thorough background of the history of IT. The history of IT will be followed with an examination of why EM is better for the MEDCOM; this examination will be presented through five propositions. The propositions will be followed by a clear explanation of EM and the MEDCOM EM goals. EM will then be further discussed with a review of EM solutions as well as the necessary strategic vision required for EM to be successful.

Background

Over the last 50 years, advancements in IT have impacted business processes significantly. An understanding of the background and development history of automation will

assist leaders in making informed decisions in the way IT is incorporated into their business support processes. In the late 1950s, J.C.R. Licklider envisioned huge networks; the problem was no one knew how to build something of this magnitude (Griffin, 2000). In 1957, the Russians initiated the space race by launching Sputnik, the first space satellite. President Eisenhower, through the Department of Defense (DoD), soon initiated the Advanced Research Projects Agency (ARPA) oriented around scientific and technology research. In 1962, ARPA initiated research in coordinating command and control of the nuclear arsenal of the (U.S.) This research led to the first computer network connecting the U.S.'s nuclear missiles and bombers. The decentralized design connected distant locations with the goal of surviving a nuclear attack while having the infrastructure to coordinate a counter attack. Named the ARPANET and constructed in 1969, the first physical network linked four universities: The Universities of California at Los Angeles and at Santa Barbara, the Stanford Research Institute, and the University of Utah (Kristula, 2001).

Computers shifted from being computational tools and became communication tools when Ray Tomlinson invented e-mail in 1972. Also in 1972, the ARPANET established its Network Control Protocol (NCP) as the standard for data transfer (Kristula, 2001). NCP had its limitations. In 1973 development started on the Transmission Control Protocol/Internet Protocol (TCP/IP) protocol, designed to link various kinds of packet networks (Internet Society, 2004; Kristula, 2001). In their 1974 paper on Transmission Control Protocol, Vint Cerf and Bob Kahn first coined the term "internet" (Stoilova, No Date). In 1976, there were many significant networking initiatives; the creation of Ethernet by Dr. Robert Metcalfe led to the development of LANs, the first satellite packet network, called SATNET, connected Europe and the U.S., and the ARPANET began experimenting with TCP/IP (Kristula, 2001).

In 1983, the ARPANET completely replaced NCP with TCP/IP and the University of Wisconsin created the Domain Name System (DNS). DNS allows domain names to be translated to internet protocol numbers, allowing people to associate host locations by name rather than remembering long number sequences (Kristula, 2001). In 1984, the ARPANET was split into two networks: the MILNET continued to serve the needs of the military, while the ARPANET continued to support advanced research. Much faster data transmission lines were created, called T1, and were capable of transmitting at a rate of 1.544 megabits per second. They were 25 times faster than the existing slower lines. Between 1985 and 1988, the National Science Foundation Network (NSFNET) deployed T1 lines nationwide and formed the first major backbone of the internet (Internet Society, 2004; Kristula, 2001).

Network traffic increased so quickly after the 1988 completion of the T1 infrastructure that plans were initiated for a network infrastructure upgrade. Starting in 1990, much faster T3 lines were created and by 1991 the NSF connected all of its sites using this infrastructure. In 1990 the ARPANET was taken out of service and the DoD started using the much more robust NSFNET backbone (Kristula, 2001). Also in 1990, Tim Burners-Lee, working through the European Organization for Nuclear Research (CERN), developed a hypertext technology. In 1992, CERN released the World Wide Web (Gribble, 2005; Kristula, 2001). Marc Andreessen and the University of Illinois, in 1993, released Mosaic the first graphical user interface web browser (Kristula, 2001; NCSA, 2004).

By 1994, the use of the internet had grown exponentially, with hundreds of thousands of new hosts being added. A host is defined as a computer that is connected to a network (Webopedia, 2005). When private businesses started online interfaces, it was now possible to order commercial products and conduct internet banking. Starting in 1995, the NSF no longer

allowed direct connections to its backbone. Internet connections to the NSF network were contracted to four subsidiary companies that sold access to other companies and organizations. Additionally domain name registration now required a fee (Kristula, 2001). In the late 1990s, the internet continued to grow worldwide and developed into an essential communication device requiring increased regulation, security, and legal standards. In 1999, the first cyber war took place while the U.S. was engaged with Kosovo (Zakon, 2005).

Computer security emerged as an important consideration as the number of viruses and malicious network attacks began to increase in frequency. From 2000 to 2005, the growth of the internet has had a worldwide impact on all parts of commerce, economies, and lifestyles. Figures through 2004 reflect the internet having over 300 million hosts and 56 million web servers (Zakon, 2005). As automation has continued to proliferate, and business networks have become intricate parts of organizations, the need for centralized management has increased. LAN management and security has grown and evolved into EM where all computers and networks are centrally coordinated and administered. Robust EM of networked assets has become the expected industry standard (Curtis and Scott, 2003).

Statement of the Problem

One of the largest challenges with IT in the MEDCOM is the lack of visibility of networked IT assets. Much of the cost of IT is due to this visibility deficiency that, in turn, hinders planning and causes redundancies in functions, personnel, and efforts. Without effective management of the MEDCOM's IT assets, visibility will not be improved, planning cannot be properly coordinated, and costs cannot be significantly addressed. High costs from redundant services and functions are second and third order conditions that result from this absence of

visibility. An effective EM plan will provide this visibility, will enable proactive planning, and foster an environment where efficiencies in planning can be coordinated.

The AMEDD is made up of all medical assets in the U.S. Army. The MEDCOM includes all fixed hospitals, medical commands, and agencies but not field medical units (AMEDD, 2005). The development of computer automation in the MEDCOM has not been centrally coordinated. In the early to mid 1990s, automation knowledge and understanding varied greatly throughout the leadership of the MEDCOM. As the use of automation increased, the Information Management Divisions expanded to support this growth and internally managed their expanding automation support. Centralized IT policy developed slowly and enterprise wide initiatives consisted mainly of infrastructure improvements and e-mail coordination standards. Experienced information management (IM) officers developed as these officers maintained the growth of IT in their facilities and participated in the expansion of automation in support of AMEDD operations.

The knowledge and requirements of managing automation resources has not been fully understood by AMEDD leadership. EM, as an IT business enabler, must be understood before it can be successfully implemented. Netivity (2005) points out that EM requires both an understanding of the technology as well as how these technologies should be implemented to achieve business objectives. EM helps address problems such as “meeting service level guarantees, deploying critical applications smoothly, leveraging internal skills appropriately, and improving communication between separate IT functions” (Netivity, 2005, p. 1).

The authority of local MTF and MEDCEN commanders enables them to decide the manner in which automation is deployed in their facilities. Without an understanding of the benefits of EM, some commanders may not be open to adopting EM initiatives without a

directive policy. IT support is often looked at through old paradigms while newer, more robust technology solutions remain unknown. The lack of EM coupled with the differences in resident knowledge and expertise throughout the MEDCOM, results in disjointed adherence to security measures and standards which leads to vulnerabilities and inefficient as well as costly IT management.

The agencies within the MEDCOM are technologically independent and uncoordinated from an IT management perspective. The centralized administration of IT through EM will reduce redundancies, help alleviate security risks, improve response time to contingencies, and save the MEDCOM resources. The implementation of EM in the MEDCOM will be a significant achievement and the key to success is a clear understanding of the goals and a focused approach to achieving the EM objectives (Kalakota and Robinson, 2003).

Literature Review

An understanding of the impact of EM on IT in the MEDCOM is explained by first reviewing why EM is better for the MEDCOM. This explanation uses propositions to support this idea. The proposition based argument is founded in theory research. "If propositions are used, they should be limited to specifying the logically deduced implications for research of a theoretical argument" (Whetten, 1998, p. 492). Whetten (1989) proposes that theory development and empirical research are linked and that propositions should be based on why's, how's, and what's. Whetten (1989) further states that when examining why research is conducted an examination of how's and what's produce propositions that are testable.

Bacharach (1989, p. 498) describes theory as, "a statement of relationships between units observed or approximated in the empirical world. Approximated units mean constructs, which by their nature cannot be observed directly." Theory seeks to answer the how, when and why, while

description seeks to answer the what. Theory is supported by constructs and on the abstract level, the relationships between constructs are propositions (Bacharach, 1989). The proposition communicates construct relationships and, to be valid, the proposition supported constructs must be parsimonious and have clarity. Additionally, Bacharach (1989) points out that propositions must contain constructs that can be researched, that propositions must contain logical and empirical adequacy.

Logical adequacy is the logic in a proposition and ensures that a proposition is able to be disconfirmed (Bacharach, 1989). A proposition must meet two criteria to meet logical adequacy. The first is, "to be falsifiable, the antecedent and the consequent may not be epiphenomenal. That is, the sheer existence of the antecedent may not automatically imply the existence of the consequent" (Bacharach, 1989, p 505). The second criterion is that the proposition must have incorporated, "an explicit statement of whether the antecedent is a necessary sufficient, or necessary and sufficient condition for the consequent" (Bacharach, 1989, p 506).

For a proposition to have empirical adequacy it must be operationalized so that the theory it supports be open to disconfirmation (Bacharach, 1989). Propositions having empirical adequacy must follow certain criteria. According to Bacharach (1989, p506), "There either must be more than one object of analysis or that object of analysis must exist at more than one point in time."

Proposition based studies help build a case for an argument. As Coppola (2004) points out, propositions are able to show the position of things as long as the statements are true. The case for why EM is better for the MEDCOM is presented in four propositions, each supporting and building on one another. The propositions have clarity, are parsimonious, and contain logical and empirical adequacy.

Proposition 1: The rapid changes in IT support requirements are not always fully understood by senior leaders and executive staff.

Over the past 20 years, the development of automation and its place in business has steadily increased. Business automation in support of established business models has evolved with advances in tools and technology. In the mid to late 80s, business computer use was limited to mostly isolated computers that did little more than word processing and other basic office automation. In the late 80s and early 90s, the proliferation of business networks started to be seen. Initially, LANs were established and soon Wide Area Networks (WAN) connected businesses across the country (Novel, 2005; Zakon, 2005). Communication protocols had long been established, though the tools to implement and manage these LANs and WANs were developed at a slower pace. Web-Based Enterprise Management (WBEM) proposes a set of standards for the management of an enterprise network. WBEM was envisioned in 1996 by leading computer and network companies including Microsoft®, Compaq®, Cisco Systems®, and Intel® (Microsoft, 2000). From 1996 to 1998, Microsoft's® continued development of remote administration tools led to the development of WBEM resulting in a simplified systems management environment (Microsoft, 2000).

By the mid 90s, network management tools were standard practice in most businesses to include the MEDCOM. In the late 90s, the network administration tools available provided more flexibility and utility than ever before. Remote administration of networked IT assets became the standard way to administer a network though many businesses, including most of the MEDCOM, still manually administered their computers one at a time. As new technology becomes available it takes time to trickle down to be used by businesses and EM has been no exception. Available to a limited extent in the Windows2000 operating system and broadened

extensively in WindowsXP, the EM functionality that is enabled by Active Directory (AD) provides management possibilities greater than at any time previously. Using EM tools such as Micorsoft's® Systems Management Server (SMS), network administrators are able to provide remote administration down to the computer desktop and across a distributed network (Microsoft, 2005a).

The development of the capabilities of network tools has grown tremendously and often faster than their implementation value can be fully realized. Executive leaders developing strategic management plans for their organizations are not always aware of the tools available that could facilitate their goals and objectives. Barnes and Crawford (2004) identify the latest phase of computer evolution as being driven by the internet and they point out that the next phase of software needs to focus not on individuals and departments, but rather on uniting and focusing individuals and departments so they are able to realize improvements in organizational productivity.

In their discussion of environmental change and the need for environmental scanning Yasai-Ardeni and Nystrom (1996) posit that organizations must adapt to changes in order to not only survive but to also prosper. Successful change requires an awareness of the strengths and weaknesses of an organization as well as current and potential problems. Environmental scanning is the monitoring of an organization's tasks and includes forecasting and the development of assumptions about the future. Environmental scanning supports the organization as it handles complexity and uncertainty. The environmental scanning of the MEDCOM's IT posture is important in the understanding of IT support requirements.

The majority of executive leaders in the MEDCOM are Lieutenant Colonels and Colonels, averaging 20 to 30 years of military service. These leaders started their active duty

service between 1975 and 1985, at a time when computers were in their infancy and EM was a relatively unknown concept. During their tenure of service, the current executive leaders of the MEDCOM have been involved with the proliferation of automation as it has integrated into the business processes of health care. Though versed in general automation concepts, most leaders will not know what IT options are available to support the organization's strategic goals without focusing on the latest developments in IT tools and resources.

Besides having an awareness of available IT tools, leaders must also consider the timing of the implementation of these tools (Elliot, 2002). The evolution of automation management in the MEDCOM is best observed by considering the stages it has gone through. The first stage started with the onset of isolated computers in organizations. These computers were standalone devices that were not networked and were administered manually. The second stage was initiated when organizations started to network their computers and build LANs and WANs. The remote management of the computers on these LANs reached various levels of success as MEDCOM MTFs operated in isolation from each other. Working in this decentralized manner, MTFs attempted to acquire resources and knowledge in efforts to successfully implement network administration solutions. The third phase of the automation evolution in the MEDCOM started when the medical regions attempted to implement a limited version of EM by establishing remote administration of the computers across their WANs. Only the North Atlantic region enjoyed limited success while the initiatives of other regions were not successful. There were also many redundant costs as the regions were operating in isolation from each other. Though the regions were fewer and bigger than when the MEDCOM MTFs faced this challenge in phase two, the challenges faced in the third phase were the same as the second phase; there was a disparity in resources, knowledge levels, technical skills, and initiatives throughout the

MEDCOM. Additionally, the success rate of regional EM varied and often achieved little more than limited progress. The MEDCOM is currently starting to enter the fourth phase of its automation evolution, the implementation of EM and the centralized management of LAN and WAN assets. Leveraging resources in the accomplishment of EM is the next step in using IT to support the heath care goals, objectives, and business processes of the MEDCOM. The technology is available, the infrastructure is in place, and the plan has been established (Patton, 2005). Future phases of the evolution of IT are inevitable, these may include a Military Health System (MHS) EM solution and perhaps even a DoD EM structure.

Automation is part of the MEDCOM business process. The IT environment is fluid and as there have been many developments in the past 20 years the future holds even more changes as technology and automation tools continue to develop. To more efficiently lead their organizations, executive leaders must understand the automation concepts and tools that can support their business processes. EM is an automation management tool that, when effectively implemented, can make organizations more efficient.

Proposition 2: Organizations who implement enterprise management are more efficient.

Businesses are often measured by their success in executing transactions and processes and less often on their ability in implementing strategy, especially when strategy implementation is measured in years rather than quarters or months (Bell and Lopez, 2003). The incorporation of strategy and IT results in success. The opposite of this is technology driven change that often fails. The linking of IT and strategy development result in processes that do not suffer from false starts, re-dos, poor morale and a negligence of stakeholder interest (Bell and Lopez, 2003; Donovan, 2000).

Bell and Lopez (2003) recommend designing integrated sequences for strategy change, priorities, and IT. They point out that when starting with IT, it becomes difficult to demonstrate potential business value. Successful strategic direction is based on establishing priorities and then implementing IT where it is most practical. IT is best measured in its ability to support business processes, where it can function as an enabler of change. As the primary enablers of change, the executives and middle managers of an organization must manage and guide the culture of an organization. As strategic investments in IT are integrated into business decisions, there will be a decrease in the risk of investment in IT (Bell and Lopez, 2003). Mitigation of risk is an essential goal of EM. Holmes (2005) asserts as businesses rely more on IT, the assessment of enterprise risk increases in importance.

The operational role of IT is moving from the management of components, servers and applications, to the management of business oriented services that span an organization from end-to-end (Curtis and Scott, 2003; Scott, 2003). This change is being driven by businesses that find the management of components lacking and seek IT services that support its business processes. Because of the difficulty in making this transition, Curtis and Scott (2003) estimate only 20% of large enterprises have successfully made the transition and fewer than 35% of large enterprises will have achieved end-to-end IT management through 2007. Curtis and Scott (2003) further state that business models depending on IT infrastructure performance will require managers that understand end-to-end requirements. End-to-end IT management results in reduced downtime and quicker problem resolution. This is accomplished through focusing on the higher priority, business relevant, issues rather than reacting to emergencies. Additionally, end-to-end IT management creates more processes that are repeatable, resulting in lower labor costs (Curtis and Scott, 2003).

Organizations that standardize processes and consolidate automation will not only improve the quality of service provided but reduce labor expenses. Curtis and Scott (2003) estimate that by implementing enterprise service management and moving away from reactive management, labor costs can be reduced by 32 percent. The implementation of EM will increase complexity, which if not managed correctly, can lead to an increase in total cost of ownership (TCO) and a reduction in service quality. Complexity can be minimized through deployment in an environment based on structure and standards using the right tools and technology (Curtis and Scott, 2003). EM fosters centralization resulting in economies of scale of both staff and infrastructure, as well as a consolidation of buying power, elimination of redundancies, and an improvement in quality of service (Meyer, 2005).

Enterprises that do not put into place processes that support business requirements will be at a disadvantage that can lead to IT delivery inefficiencies and increased costs (Curtis and Scott, 2003). Though many enterprise benefits are intangible and hard to evaluate financially (Sedera, Gable, and Rosemann, 2001), Rosser (2003) points out that in an enterprise there is a connection between profit and IT. The integration of EM into strategic planning and management produces business advantages, improvements in quality, increased efficiencies, and cost savings.

Proposition 3: Increased adherence to IT standards is a better allocation of the MEDCOM's resources.

Establishing IT standards is essential to supporting the missions of the MEDCOM. Standards also play a key part in the strategic planning of EM where there is a greater emphasis on IT contingency planning. The continued establishment of IT standards is vital to the success of an EM deployment, from the standard operating procedures and protocols that direct administrators on all levels to the standards of excellence and expected service levels when

interfacing with customers. The establishment of standards results in simplifying an IT environment and results in not only improved services but an estimated TCO savings of up to 30 percent (Heine, 2003).

The continued establishment of IT standards throughout the MEDCOM directly supports the three AMEDD missions. Mission 1: Project and sustain a healthy and medically protected force. Mission 2: Deploy a trained and equipped medical force. Mission 3: Manage the Care of the soldier and the military family (AMEDD, 2005). Serving as the agent for coordinating the IT goals of the AMEDD, The United States Army Medical Information Technology Center, (USAMITC) has demonstrated a pattern of success in establishing IT standards in the MEDCOM. Successful initiatives include the deployment of an AD architecture tying together the servers throughout the MEDCOM into a unified hierarchy. AD is defined as, "the means to manage the identities and relationships that make up network environments" (Microsoft, 2005b, p 1). Along with AD, USAMITC standardized the e-mail system in the MEDCOM by implementing a Microsoft® Exchange domain that consolidated approximately 71 separate domains into three. Also standardized across the MEDCOM is the enterprise license agreement that centrally purchases Microsoft® and other standard software. This relieves each site from acquisition and license maintenance. Additional standardization includes outlining the network security hardware in the MTFs of the continental US and coordinating the monitoring of this security hardware by the Tri-Service Infrastructure Management Program Office (TIMPO) (Patton, 2005).

The remote administration of servers and workstations requires specialized software management tools. While there are several tools that will accomplish the objectives required by the MEDCOM to accomplish EM, the tool of choice is SMS. Active management tools that will

enhance standardization include software distribution, server maintenance schedulers, and backups (Paquet, 2003). These technologies automate tasks that were previously performed manually, resulting in removing operators and operator error. Paquet (2003) estimates that operator error accounts for 40 percent of unplanned downtime.

Standards foster an environment where procedures are repeated, resulting in increased consistency and a reduction in costs of both components and processes (Scott, 2003). As IT management solutions grow in complexity, IT integration will rely on robust plans that are based on standards (Paquet, 2003). Workflows and processes are where IT provides its biggest impact for an organization and the standardization of these are what will enable EM to be successful as well as provide for the best allocation of resources within the MEDCOM.

Proposition 4: The development of EM as a policy is better for the MEDCOM.

The implementation of EM in the MEDCOM will require a policy directive. The optional adoption of EM, by the various MEDCOM agencies, has returned mixed results to include some agencies opting not to participate. The business role of automation has evolved to the point where fully functional IT systems require centralized management. Establishing policies is an effective management tool that can result in efficiencies and cost savings (Curtis and Scott, 2003; Scott, 2003). Embracing EM in the MEDCOM requires a vision and a perspective from the top down. The EM vision is also known as an IT enabler.

An IT enabler is defined as, "The umbrella functional domain that includes core technologies and services supporting automated business processes across the enterprise. It includes networks, end-user devices, help desks, servers, security, business applications, collaboration tools, and associated resources needed to deliver these capabilities and services" (Hume, 2005). A functional EM umbrella does not currently exist in the MEDCOM. The

development of EM as an IT enabler will result in enhanced patient care, money saved, heightened security, and standardized operations (Patton, 2005).

The current state of the MEDCOM IT enterprise is a reactive environment made up of independent groups of computers within each medical region and in some cases individual MTFs. This disconnected distribution of IT operations creates a duplication of effort, lack of standardization, increased vulnerability, and excessive complexity (Patton, 2005). The goal of EM is to connect these groups and enable proactive response to changes that lead to risk mitigation, economies of scale, duplication of effort reduction, trend analysis and the prediction of problems. EM policy will enable the AMEDD to centralize, consolidate and standardize IT operations. EM implementation in the AMEDD will save money through the total cost of EM, enhanced security through increased information assurance and vulnerability assessment compliance, standardized operations, and an automated environment that will enhance patient care by proactively monitoring and reporting server health and performance (Reynolds, Ylinen, Brookshire, and Bowlin, 2005). The establishment of a MEDCOM policy directing EM will enable an environment where these conditions exist.

Proposition 5: USAMITC should manage the integrated EM environment

Establishing an integrated EM environment within the MEDCOM will allow the AMEDD to follow their IT strategic plan. USAMITC bases its support of EM on four functional pillars: Acquisition, sustainment, customer support, and operations. Through the processes of interfacing, coordinating and negotiating, USAMITC representatives seek to identify the best solutions to accomplish the MEDCOM IT requirements. USAMITC representatives interface with the IT industry for outsourcing solutions, coordinate the development and acquisition of products and services and negotiate the best deal for the MEDCOM. The enterprise benefits from

these endeavors through speed in acquisition, compliance to standards, and economy of resources. EM projects are managed for optimal cost, schedule, and performance. Expertise in acquisition regulations enables USAMITC to procure commercial off the shelf products or maximize their development staff to produce products that meet unique IT needs (Patton, 2005).

Through the maintenance and development of essential application systems, and a focus on continuous infrastructure service delivery, USAMITC supports their EM mission and vision. The USAMITC EM mission is to, "Provide superior information management, technology, and services through a fully integrated, protected information enterprise that enhances local, regional, and corporate business processes and supports the MEDCOM mission" (Patton, 2005, slide 22). The EM vision includes, "An integrated, net-centric, and transparent IT environment of best practices" (Patton, 2005, slide 22).

USAMITC delivers IT products across various life cycles. With the goal of maintaining, supporting, and updating, USAMITC's full service approach delivers the complete IT solution through thoroughness, testing, training, customer support, and sustainment (Patton, 2005). Thoroughness by delivering all components as well as providing expert support as needed. Testing IT products and solutions includes meeting required standards of compliance, integration into the existing infrastructure, and meeting all established requirements. Training includes providing for new users as well as sustainment training for the existing staff. Customer support is provided through service as well as personal technician visits when required. Sustainment operations include coverage of all warranties, replacement parts, and eventually property disposal. The goal is to deliver to the customer service, flexibility and simplicity (Patton, 2005).

The business value USAMITC offers through EM includes the reduction of IT overhead, leveraging economies of scale, and providing more IT capabilities for less cost then possible

through the individual coordination capabilities of an MTF. EM facilitates the AMEDD's core mission of providing quality patient care. Through management of the IT infrastructure, USAMITC enables local facilities to focus more on patient care, resulting in a more effective AMEDD (Patton, 2005).

The initial focus of the EM plan includes five distinct focuses. These are centered on building and securing effective network management operations, end-user environments, server environment, security, and collaboration (Patton, 2005). The network management operations include the business strategy goals of centralized network management, reliable network services, secure network operations, and ensuring network performance. The plan is to manage the AMEDD security and implement a network configuration that achieves 99.5% availability. The end-user environment has the goal of managing peripheral devices, continuing the enterprise license agreements, centralized desktop management, and employing end-user training standards. The plan is to standardize the help desk software and implement EM software. The goals of the server environment include optimizing server and storage capacity, reducing support and deployment costs, attracting and retaining highly skilled systems administrators, and developing comprehensive server architecture. The implementation plan includes following the Army server consolidation plan, technical working group participation, standardization of system administrator (SA) job descriptions, and the creation of a centralized contract for SAs. The security goals are based on the development of integrated security architecture across the AMEDD that provides transparent security 24 hours a day. Also provided is a risk-based resource allocation model focused on prevention rather than reaction, and a general security environment that is oriented around prevention, reaction, and recovery. The security plan includes the publishing of the MEDCOM regulation 25-2 as well as standardized security

training with maximization of standardized information assurance tools. The collaboration goals include working with business partners and the selection of a suite of collaboration tools. The collaboration plan includes establishing collaboration policies and guidance on website management and consolidation (Patton, 2005).

Considerations of EM in the MEDCOM have been presented through five propositions explaining why EM is better for the MEDCOM. An understanding of IT support requirements is necessary for AMEDD leaders to plan and make strategic management decisions. Essential to this understanding is knowledge of the efficiencies EM provides as well as the importance of the adherence of standards. Understanding and realizing the benefits of EM require vision and a strategic perspective, additionally, the development of a policy is the best way to achieve MEDCOM EM.

Enterprise Management

The IT industry uses many different tools and utilities to facilitate EM. These tools support functions that, while disparate, often overlap and support each other. MEM combines two Microsoft® products; SMS 2003 and Microsoft® Operations Manager (MOM) 2005. SMS 2003 provides the ability to quickly and effectively provide software updates to end user devices, while MOM 2005 is used to identify and react to problems through systems health monitoring. Together SMS and MOM enable the MEDCOM to reduce costs, adhere to licensing policies and update and patch workstations and servers across the enterprise from a central location. Under MEM the MEDCOM will have a system in place to proactively affect automation contingency operations while providing support, service and standardization to network hosts (USAMITC, 2005a).

The concept of EM, as defined in this paper, is made up of five distinct functions: Secure logon, software distribution, asset management, system health monitoring, and help desk. Each function, though distinct, supports other functions resulting in the operational management of an automation enterprise. Understanding these functions and the role of MEM are essential to appreciating the goals USAMITC is achieving. There are other IT functions that are often defined as belonging to EM such as storage management and network management. While these and other functions are significant, the five functions outlined by MEM are the objectives of this paper.

Network management is an important EM function that must be distinguished from the defined MEM functions. Network management is the proactive and reactive, end to end, performance of a network. Network performance includes measuring and controlling the utilization of various network components (Rabinovitch, 1997). Network management includes the optimization of the physical hardware that connects a network, the physical components include; routers, switches, nodes, wires, and other connections tying a network together. The MEDCOM coordinates network management through cooperation between several Army and DoD agencies. The physical architecture and policies governing connectivity standards are important to the management of the MEDCOM enterprise; however, they are separate from the goals and objectives of the MEM. Network management focuses on the physical infrastructure, while MEM focuses on applications that run over this infrastructure.

Secure logon is a function that is provided by AD. A secure directory environment involves having user authorization tied to a log on authentication. Network access and network resources are protected by having a secure logon function, however, AD also confirms the identity of the user and creates an access token that determines access levels to all network

resources from a single logon. The security provided through secure logon protects network resources and allows access only to authorized users and groups (Microsoft, 2005c). The secure logon function is an essential element of EM and the first EM function enabled in the MEDCOM. USAMITC established secure logon with the installation of AD between 2000 and 2005 (Gregurvich, 2005).

Software distribution is an important EM function that is essential to cutting manpower costs and improving efficiencies. The labor intensive, much slower, manual method of software distribution involved a technician physically visiting each machine to apply software installations. With the large number of security updates and patches required in daily IT operations the impact of manual software distribution on an IT department is significant if not unmanageable. There are a large number of software distribution tools available that offer a variety of services to include; testing, packaging, configuring, and ultimately deployment (Wilson, 2003).

Currently there is not a standardized software distribution method in the MEDCOM. The lack of a standard contributes to losses in efficiencies and an increase in cost due to separate licenses and manpower needs. Lacking a standard, the MEDCOM suffers from software distribution failures. Wilson (2003) asserts that electronic software distribution implementation failures generally fall into one of three categories. The first is the inability of an IT department to handle the load. There are an increasing number of required patches and updates that must be deployed and often IT departments do not have the electronic tools to effectively distribute these patches without technicians visiting each machine. Increased manual workload creates an avoidable cost and does not address the organization's strategic IT goals. The second shortcoming of electronic software distribution involves high levels of deployment failure. Many

distribution solutions do not successfully install applications on the initial attempt. These failures are due to incompatibilities between systems and application conflicts. The third shortcoming involves the lack of integration with other management and development processes. High failure rates of electronic software distribution are correlated with decreased employee productivity, increased security risks, and poor usage of IT staff (Wilson, 2003).

The need for a standard electronic software distribution solution in the MEDCOM is significant. A standardized solution will enable the MEDCOM to avoid the common failures of electronic software distribution. A functioning software distribution solution will enable all agencies in the MEDCOM to handle the required load, reduce rates of deployment failure and facilitate integration into development and management processes. Establishing an electronic software distribution solution is one of the primary focuses of MEM.

Asset management is the EM function that works behind the scenes to keep track of what hardware and software an organization owns and utilizes. Asset management keeps track of IT licenses, contracts, and property. Musthaler (2004) defines three levels of asset management. The base level involves an electronic discovery of inventory hardware and software that is installed and being used. The second level begins to tie inventory to contracts. Comparing software licenses to enterprise usage not only confirms compliance with license agreements but ensures that money is not misallocated in over licensing. Organizations that over purchase licenses, as a preventive measure, do so to avoid litigation and other severe penalties associated with software theft. They are able to recoup savings by closer management of actual software use. As recently as 2004, the average company over purchased software licenses by 15%. Warranty contracts and maintenance agreements can also be maximized by exercising existing warranties rather than technicians fixing, in house, what has already been paid for (Musthaler, 2004).

The third level of asset management involves proactive planning based on knowledge of existing hardware and software. Usage patterns can be leveraged to negotiate with vendors and to prepare for future acquisitions. Asset management enables an organization to control IT assets and eliminate uncoordinated initiatives (Musthaler, 2004). Currently the MEDCOM does not have asset management coordinated at the enterprise level; rather the separate MEDCOM agencies have achieved various levels of limited asset management. The disparity between the success rates of the MEDCOM's subordinate organizations results in wasted resources, redundancies and unknown expenditures.

System health monitoring is another important function of EM. System health monitoring is especially important in the monitoring of servers, where hardware performance is captured, measured, and reported. System health includes monitoring end user services as well as end user hardware. Through a rule based system, alerts notify administrators when certain thresholds are exceeded or imminent problems arise. Besides enabling administrators to react quickly to problems, the monitoring of system health provides for modeling and trending of performance which can in turn be used for proactive planning. There are presently no enterprise system health monitoring capabilities nor are there established standards. MEDCOM system health monitoring is done on a limited basis by the different agencies, regions and facilities. Additionally, resident expertise varies between facility administrators resulting in a disparity of collected data and an unknown level of oversight. Without an EM systems health monitoring solution effective contingency planning is severely limited (Evers, 2005).

The help desk function of EM is vital to ensuring end users are supported and operational. The benefits of a robust enterprise help desk include fast and effective customer support, increased technician productivity, lower overall cost of service, and the standardization

of communication. Effective help desk tools and support packages enable remote administration and resolution of work orders. This in turn provides for cost savings, maximized staff utilization, improved customer satisfaction, and an increase in end user productivity (USAMITC, 2004).

Help desks are more then a central point for reporting work orders, they are an essential part of providing service and coordinating resources to address problems. Help desk support affects business at every level of an organization; the quality and proficiency of services provided are measurable and significant. The MEM plan is to implement a help desk solution where all initial customer calls are received at a centralized help desk that either fixes the problem or coordinates with the facility for further support (USAMITC, 2004). Coordinating efforts in this manner are estimated to alleviate more than 30% of the work orders IT departments are currently supporting (Curtis and Scott, 2003). Under its current help desk structure the MEDCOM's initial computer support is disjointed and redundant as each agency administers a separate help desk and coordinates separate support operations.

Purpose

The purpose of this paper is to examine the impact EM will have on IT in the MEDCOM and validate the choices MEDCOM has made in implementing EM. The lack of visibility of the MEDCOM's networked IT assets hinders planning, creates security challenges, produces redundancies, and exacerbates costs. Although implementing EM will incur a cost there are both tangible and intangible cost savings as a result. A clear description of EM functions, assessment of the costs and benefits of EM, and the current status of EM implementation in the MEDCOM will be reviewed.

Method and Procedures

The MEDCOM Enterprise Management (MEM) mission is to establish a broad solution for change and configuration management with the goal of maximizing the MEDCOM's automation investment in the enterprise. This will be accomplished through concentrating efforts to standardize IT functions. The MEM project will coordinate the configuration of networked hardware and software, with a focus on software distribution, asset management, system health monitoring and the establishment of a centralized help desk. The details of the enterprise status will be available at all levels; from the local Information Management Officers (IMO) up to the leadership of the MEDCOM. The objective is to establish a centralized hierarchy that enables all sites to benefit from contingency planning, prompt Information Assurance Vulnerability Assessment (IAVA) management, the coordinated distribution of software, and maximization of inventory management (USAMITC, 2005a).

The goals of MEM are to maximize the MEDCOM's investment in enterprise automation and to create visibility of networked assets. The impact of MEM is a qualitative study that observes both the tangible and intangible ROIs of the project. The application of the MEM plan will result in a centralized IT enterprise. To accomplish this, the MEDCOM must standardize functions and reduce redundancies. The MEM functions seek to establish a centralized solution for software distribution, asset management, systems health monitoring, and help desk. These functions are not centrally managed. They are implemented independently across the MEDCOM with various levels of success. The lack of coordination between these functions results in expensive redundancies, a lower security posture, reduced system availability, an environment with an unknown number of IT assets, an inability to effectively plan enterprise IT projects, and an inability to react to enterprise contingencies. The heavy reliance on IT to support the

MEDCOM's health care mission requires leaders to quickly evaluate the enterprise IT posture and operationally plan. MEM will dramatically reduce daunting IT data calls and provide an environment where leaders of all levels can execute effective IT solutions.

The MEM project Business Case Analysis (BCA), written by USAMITC in June 2005, determined that implementing MEM would require a $1,040,930 initial cost and a total five year cost of $14,164,504. The plan includes a three phase implementation schedule that would span 17 months. Two alternative solutions were presented. The first solution would be to outsource the management of the MEDCOM's IT assets at an estimated cost of $25 million a year. The second alternative would be to make no change and continue with the current decentralized configuration. Implementing MEM supports the MEDCOM Balanced Score Card (BSC) strategic objectives: L-2 leverage IT, F-3 demonstrates accountability for resource utilization, and IP-15 implement clinical and business best practices. Additionally the Army Knowledge Online (AKO) goal number 3 outlines that the Army information structure will be managed from the enterprise level. The estimated ROI of implementing MEM results in $16,815,150 over five years. This ROI is based on labor savings as well as cost avoidance. The estimated breakeven point for the MEM project is in the later part of the third of the five years. Figure 1 reflects the total financial benefits of $16,815,150, minus the total investment of $14,166,504, resulting in an estimated cumulative net benefit of $2,648,646 (USAMITC, 2005a).

The estimated cost of implementing MEM is based on the BCA briefed to the MEDCOM Information Management Guidance Counsel (IMGC) on July 7, 2005 (USAMITC, 2005a). Figure 2 reflects the total estimated cost for the MEM, figure 3 itemizes the contract labor costs, and figure 4 reflects the projected benefits from MEM.

The value of the MEM project is also represented in figure 5 which shows the Net Present Value (NPV) and Internal Rate of Return (IRR). NPV measures the dollar profitability of a project and is a reflection of the present value of the project's net cash flows. The IRR reflects the projects expected rate of return (Gapenski, 2003). Using the OMB (2005) circular real discount rate of 2.0 for a five year project the NPV is $2,171,633.77 with an IRR of 14.98%. Since the IRR is grater than the discount rate the MEM project is financially beneficial to the MEDCOM.

Kerlinger (1964) points out that data must be both reliable and valid. Valid and reliable data fosters faith in results and confidence in conclusions. The methodology used to estimate the cost of the MEM project involved the project management division of USAMITC evaluating each step of the three phase MEM project and determining necessary staff, level of work, required hardware and software, warranties, supplies, and training. The level of required technical expertise was determined as well as the required full time equivalents needed to complete the project. The reliability and validity, of determining the expertise level to accomplish the MEM project, are based on evaluating projects requiring similar staff and skill sets to accomplish such tasks.

Kerlinger (1964) describes reliability as repeatedly measuring the same set of objects and obtaining similar results. He further describes validity as measuring what we think we are measuring. The MEM cost estimate is reliable because similar projects have been estimated with similar results. The MEM project is valid because the scope of work is known as well as the level of effort required to accomplish the project.

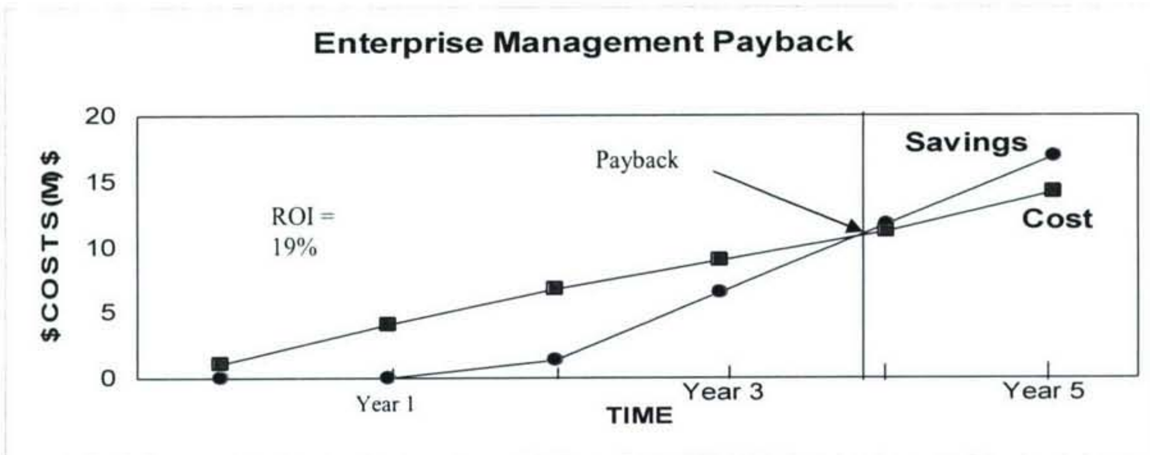

Figure 1. Expected MEM payback timeline.

Government Labor Cost	Initial	Year 1	Year 2	Year 3	Year 4	Year 5
Input Costs from Appropriate Cost Model	$ 112,499	$ 112,499	$ 112,499	$ 46,133	$ 38,444	$ 38,444
Travel Cost	$ 3,600	$ 3,600	$ 2,400	$ 2,400	$ 2,400	$ 2,400
Contract Labor Cost	$ 763,700	$ 2,081,152	$1,884,992	$1,754,432	$ 1,744,432	$ 1,858,672
Hardware/Software Costs (Summary)	$ 156,131	$ 433,024	$ 373,003	$ 145,000	$ 145,000	$ 882,158
Purchased Hardware	$ 136,131	$ 408,024	$ 348,003	$ 70,000	$ 70,000	$ 792,158
Purchased Software	$ 20,000	$ 25,000	$ 25,000	$ 10,000	$ 10,000	$ 25,000
Leased Hardware	$ -	$ -	$ -	$ -	$ -	$ -
Leased Software	$ -	$ -	$ -	$ -	$ -	$ -
Hardware Maintenance Costs	$ -	$ -	$ -	$ 40,000	$ 40,000	$ 40,000
Software Maintenance Costs	$ -	$ -	$ -	$ 25,000	$ 25,000	$ 25,000
Additional Data Storage	$ -	$ -	$ -	$ -	$ -	$ -
Upgrades to existing systems/infrastructure	$ -	$ -	$ -	$ -	$ -	$ -
Warranty Costs	$ -	$ -	$ -	$ -	$ -	$ -
Supplies	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000
Training		$ 210,000	$ 30,000	$ 30,000	$ 10,000	$ 10,000
Other	$ -	$ -	$ -	$ -	$ -	
Architecture, Networthiness, DITSCAP	$ -	$ 262,668	$ 237,049	$ 188,057	$ 186,288	$ 271,427
Annual Total	$1,040,930	$ 3,107,943	$2,644,944	$2,171,022	$ 2,131,564	$ 3,068,102
Cumulative Total	$1,040,930	$ 4,148,873	$6,793,817	$8,964,838	$ 11,096,402	$ 14,164,504

Figure 2. Total estimated cost of MEM.

Initial			
IT Contract Personnel	# of Personnel	Base Costs	Total Cost per Staff Member
Contract Project Director	0.3	$ 153,600	$ 46,080
Contract Project Support Personnel	0.2	$ 96,000	$ 19,200
Contract Senior Consultant	0.6	$ 470,400	$ 282,240
Contract Engagement Manager	0	$ 480,000	$ -
Contract PMO Support	0	$ 480,000	$ -
Contract SQO Support	0	$ 480,000	$ -
Contract Technician II	0	$ 311,000	$ -
DT&E	0.1	$ 134,400	$ 13,440
Contract Systems Manager	0	$ 172,000	$ -
SMS Contract Support T3	1.3	$ 185,000	$ 240,500
SMS Contract Support T2	1.3	$ 124,800	$ 162,240
CCB Board Support	0	$ 150,000	$ -
Contract Help Desk Technical Suppor	0	$ 96,000	$ -
Total Contract Staff/Expense	3.8		$ 763,700
Contract Non-Labor Costs			
Other Direct Costs	[redacted]		$ -
Indirect (G&A and Fee)			$ -
Total Contract Costs			$ 763,700

Year 1 FY06			
IT Contract Personnel	# of Personnel	Base Costs	Total Cost per Staff Member
Contract Project Director	0.5	$ 153,600	$ 76,800
Contract Project Support Personnel	1	$ 96,000	$ 96,000
Contract Senior Consultant	1	$ 470,400	$ 470,400
Contract Technician II	2	$ 316,800	$ 633,600
DT&E	0.5	$ 134,400	$ 67,200
Contract Systems Manager	0.3	$ 176,640	$ 52,992
SMS Contract Support T3	2	$ 177,600	$ 355,200
SMS Contract Support T2	1.3	$ 124,800	$ 162,240
SMS Contract Helpdesk T1	1	$ 78,720	$ 78,720
CCB Board Support	0.2	$ 150,000	$ 30,000
Contract Help Desk Technical Suppor	0.5	$ 96,000	$ 48,000
			$ -
			$ -
Total Contract Staff & Expense	10.3		$ 2,071,152
Contract Non-Labor Costs			
Other Direct Costs	[redacted]		$ 10,000
Indirect (G&A and Fee)			$ -
Total Contract Costs:			$ 2,081,152

Year 2 FY07			
IT Contract Personnel	# of Personnel	Base Costs	Total Cost per Staff Member
Contract Project Director	0.5	$ 153,600	$ 76,800
Contract Project Support Personnel	1	$ 96,000	$ 96,000
Contract Senior Consultant	1	$ 470,400	$ 470,400
DT&E	0.5	$ 134,400	$ 67,200
Contract Systems Manager	0.3	$ 176,640	$ 52,992
SMS Contract Support T3	2	$ 185,000	$ 370,000
SMS Contract Support T2	1.3	$ 124,800	$ 162,240
SMS Contract Helpdesk T1	0.5	$ 78,720	$ 39,360
CCB Board Support	1	$ 150,000	$ 150,000
MOM Contract Support T3	1	$ 201,600	$ 201,600
MOM Contract Support T2	1	$ 150,000	$ 150,000
MOM Contract Helpdesk T1	0.5	$ 76,800	$ 38,400
Total Contract Staff/Expense	10.6		$ 1,874,992
Contract Non-Labor Costs			
Other Direct Costs	[redacted]		$ 10,000
Indirect (G&A and Fee)			$ -
Total Contract Costs:			$ 1,884,992

Year 3 FY08			
IT Contract Personnel	# of Personnel	Base Costs	Total Cost per Staff Member
Contract Systems Manager	0.3	$ 176,640	$ 52,992
Contract Project Support Personnel	1	$ 96,000	$ 96,000
Contract Senior Consultant	1	$ 470,400	$ 470,400
SMS Contract Support T3	2	$ 185,000	$ 370,000
SMS Contract Support T2	1.3	$ 124,800	$ 162,240
SMS Contract Helpdesk T1	0.5	$ 78,720	$ 39,360
DT&E	0.1	$ 134,400	$ 13,440
CCB Board Support	1	$ 150,000	$ 150,000
MOM Contract Support T3	1	$ 201,600	$ 201,600
MOM Contract Support T2	1	$ 150,000	$ 150,000
MOM Contract Helpdesk T1	0.5	$ 76,800	$ 38,400
			$ -
Total Contract Staff & Expense	9.7		$ 1,744,432
Contract Non-Labor Costs			
Other Direct Costs	[redacted]		$ 10,000
Indirect (G&A and Fee)			$ -
Total Contract Costs:			$ 1,754,432

Year 4 FY09			
IT Contract Personnel	# of Personnel	Base Costs	Total Cost per Staff Member
Contract Systems Manager	0.3	$ 176,640	$ 52,992
Contract Project Support Personnel	1	$ 96,000	$ 96,000
Contract Senior Consultant	1	$ 470,400	$ 470,400
SMS Contract Support T3	2	$ 185,000	$ 370,000
SMS Contract Support T2	1.3	$ 124,800	$ 162,240
SMS Contract Helpdesk T1	0.5	$ 78,720	$ 39,360
DT&E	0.1	$ 134,400	$ 13,440
CCB Board Support	1	$ 150,000	$ 150,000
MOM Contract Support T3	1	$ 201,600	$ 201,600
MOM Contract Support T2	1	$ 150,000	$ 150,000
MOM Contract Helpdesk T1	0.5	$ 76,800	$ 38,400
			$ -
Total Contract Staff/Expense	9.7		$ 1,744,432
Contract Non-Labor Costs			
Other Direct Costs	[redacted]		$ -
Indirect (G&A and Fee)			$ -
Total Contract Costs:			$ 1,744,432

Year 5 FY10			
IT Contract Personnel	# of Personnel	Base Costs	Total Cost per Staff Member
Contract Systems Manager	0.3	$ 176,640	$ 52,992
Contract Project Support Personnel	1	$ 96,000	$ 96,000
Contract Senior Consultant	1	$ 470,400	$ 470,400
SMS Contract Support T3	2	$ 185,000	$ 370,000
SMS Contract Support T2	1.3	$ 124,800	$ 162,240
SMS Contract Helpdesk T1	0.5	$ 78,720	$ 39,360
Contract Sr Consultant (Redeploy)	0.2	$ 470,400	$ 94,080
CCB Board Support	1	$ 150,000	$ 150,000
MOM Contract Support T3	1	$ 201,600	$ 201,600
MOM Contract Support T2	1	$ 150,000	$ 150,000
MOM Contract Helpdesk T1	0.5	$ 76,800	$ 38,400
DT&E	0.25	$ 134,400	$ 33,600
Total Contract Staff & Expense	10.05		$ 1,858,672
Contract Non-Labor Costs			
Other Direct Costs	[redacted]		$ -
Indirect (G&A and Fee)			$ -
Total Contract Costs:			$ 1,858,672

Figure 3. Estimated contract labor cost MEM.

PROJECT BENEFITS(SAVINGS) COMPUTATIONS

	Initial	Year 1	Year 2	Year 3	Year 4	Year 5
COST SAVINGS	0	0	0	0	0	0
Labor Savings						
Travel Savings	$0	$0	$0	$0	$0	$0
Rental Savings						
Contract Savings		0	0	0	0	0
Supply Savings						
Equipment Savings						
Other Savings						
COST AVOIDANCE	0	0	$ 1,303,500	$ 5,170,550	$ 5,170,550	$ 5,170,550
Labor			$ 1,303,500	$ 5,170,550	$ 5,170,550	$ 5,170,550
Travel	$0	$0	$0	$0	$0	$0
Rental						
Contract		0	0	0	0	0
Supply						
Equipment						
Other Avoidance						
REVENUE PRODUCTION	0	0	0	0	0	0
3rd Party Collection						
MCSC Cost Recovery						
Other						
Annual Benefit	0	0	$ 1,303,500	$ 5,170,550	$ 5,170,550	$ 5,170,550
Cumulative Benefit	0	0	$ 1,303,500	$ 6,474,050	$ 11,644,600	$ 16,815,150

Cost Avoidance: MEM will allow MTF's to reallocate resources presently required for IAVAs and system releases.

Figure 4. Projected Benefits from MEM.

	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Cost	$ 1,040,930	3,107,943	2,644,944	2,171,022	2,131,564	3,068,102
Benefits	$ -	-	1,303,500	5,170,550	5,170,550	5,170,550
Net Cash Flow	$ (1,040,930)	$ (3,107,943)	$ (1,341,444)	$ 2,999,528	$ 3,038,986	$ 2,102,448
NPV	$2,046,913.72					
IRR	14.98%					

Figure 5. NPV and IRR.

There are a variety of EM tools and solutions developed by several different IT companies. Three industry leading products that have the capability to manage an enterprise the size of the MEDCOM are SMS, Tivoli, and Unicenter. All three products are credible and capable of serving as the EM solution. However, SMS has been chosen and is currently being implemented. SMS is deployed in the MEDCOM to a limited extent and currently has the

capability to manage approximately 20,000 hosts of an estimated 80,000 potential hosts (USAMITC, 2005b). Though the MEM project has started with a limited implementation of SMS, a look at why SMS is a better choice over Tivoli and Unicenter should be examined.

All three EM products offer the essential services needed in MEM; software distribution, asset management, configuration management, and patch management. The shades of difference between the three products are minimal, each offers unique features the others do not, however, all have the essential core features that are needed to administer an EM environment. Additionally, all three products are under constant improvement with plans to expand services. Keeping up with what product may have a marginal lead over the others is not practical, and once one solution is chosen switching products may not be cost effective. Though SMS has already been chosen, and will continue to be used, a review of the cost details will show that SMS was the best financial choice.

EM software products are purchased through vendors that tailor the sale to the needs of the organization making the purchase. Contracts with especially large organizations are often negotiated, and depending on the details of the purchase, the price is often flexible with large purchases being discounted. All three products have complex pricing arrangements that vary between the unique ways the companies charge for the different services and packages that make up each product. The nature of these differences does not facilitate a direct line by line itemization. In his comparison of SMS and Tivoli, Shelton (2004) calculates that all hardware and software costs of a Tivoli EM solution are 70% more expensive than a comparable SMS solution. All three products charge for each client license and both SMS and Tivoli charge approximately $50 dollars per client license (Shelton, 2004).

The MHS Enterprise License Agreement (ELA) provides user licenses for many different software products to include a Microsoft® ELA providing an unlimited supply of SMS client licenses. The ELA is designed to leverage buying power as well as minimize the expenses associated with acquisition and support (DA, 2005). Shelton (2004) estimates SMS client licenses to be approximately $50 dollars per SMS client, all of which the MEDCOM is already paying for. Without the ELA the cost for SMS client licenses would be approximately $4 million dollars for 80,000 clients. By implementing SMS as the MEM solution not only is this $4 million not incurred in an SMS EM cost proposal but this same $4 million would have to be accounted for if an alternate product to SMS was implemented.

All EM solutions will require trained expertise. USAMITC has an existing SMS staff administering approximately 25% of the MEDCOM enterprise and is positioned to expand (USAMITC, 2005b). Implementing an alternate EM solution, either Unicenter or Tivoli, will require a change in not only staff but also in consulting costs, server licenses, software licenses, training, as well as installation time of all sites currently using SMS. There is no ROI for the time, effort, or money involved in a change of this sort. Shelton (2004) points out that the competing products to SMS all provide the same basic functions and are of generally equal ability.

The Results

The results of the MEM study are that an investment of $14,164,504 will be the most cost effective method of establishing industry standard enterprise management in the MEDCOM. The benefits are an estimated tangible ROI that nets $2,648,646, with an NPV of $2,171,633.77 and an IRR of 14.98% the investment is financially sound. Additionally, there are many intangible ROIs. Intangible ROIs include improved contingency planning and reaction, a heightened

security posture, improved system availability resulting directly in the quality of delivered health care as well as cost savings from reduced down time, and protection from litigation through software license management. Perhaps the most significant ROI is the peace of mind of the MEDCOM leadership from knowing they have a well managed healthy enterprise. This peace of mind comes from the knowledge that is gained from having visibility over exactly what IT assets exist as well as visibility of expected IT costs. The reporting capabilities of SMS are extensive and are the key to providing this visibility.

Discussion

The April 1, 2004 MEDCOM Information Management/Information Technology (IM/IT) data call showed the total MEDCOM IM/IT expenses for 2003 to be $281,657,206. This was almost double the IM/IT funding for 2003 which was $147 million (MEDCOM, 2004). Before this data call, the actual amount spent on IM/IT was unknown. Even with a snapshot of expenses in 2003, the prospect of duplicating such a data call would require a significant investment of energy and resources. The lack of visibility to MEDCOM leaders of hardware and software assets contributes to the murkiness of estimating the actual costs of IM/IT. This lack of visibility creates an inability to proactively plan or quickly react to contingencies as well as challenge the ability of leaders to meet deadlines and compliance levels.

The visibility provided by the MEM will enable future data calls to not only be resolved more quickly but for the data to be more reliable and valid. This visibility will come from automated reports that do not rely on multi-person teams at dozens of locations researching the number of networked hardware and software components. Not only is manpower saved but by also eliminating most human error data is much more accurate. The reporting capabilities of SMS are extensive. There are many built-in reports that will answer most query scenarios as well

as the ability to tailor reports to fulfill individual needs. The implementation of MEM will provide for visibility and reporting that does not currently exist. MEM also facilitates a heightened security posture that comes from being able to quickly assess and react to contingencies.

The initial cost of implementing an EM solution is significant. However, the cost of an EM solution ends up paying for itself. Industry reports reflect that the recovery costs of a single virus outbreak are greater than an SMS 2003 installation (Shelton, 2004). In addition to disaster recovery and prevention the cost savings from help desk remote management must also be considered. The non discounted retail cost of SMS equates to the cost of 2.5 average help desk calls per user and the average employee calls the help desk once per month (Shelton, 2004). At these rates the ROI from help desk remote management alone will cover the expenses of an EM implementation within three months.

Without a full MEM implementation there will be no change to the continued costs generated by regional EM redundancies. The efforts of some medical regions to implement EM addressed many of the needs outlined in this paper but only on the regional level. The existence of regional EM solutions, rather than one MEM scenario, has created unnecessary administrative overhead as well as barriers to visibility. These regional needs are valid and deserving of EM efforts, however, regional EM solutions not only create redundant costs for implementation and maintenance but also do not provide the MEDCOM leadership the ability to have IT data reports that reflect the status of all hardware and software assets. Redundant costs include the purchase of various EM solutions that do not maximize the ELA as well as the high cost of retaining top level expertise at each region. There are also sustainment and multiyear follow up costs associated with EM contracts. A centralized help desk and centralized EM support from one

MEDCOM location will consolidate all top level administrative expertise. A small staff of the highest technical ability that will support all end users is much more cost effective than the same small staff of experts duplicated at various sites across the MEDCOM.

The need for MEM could not be greater. The combination of the many MHS systems and the coordinating efforts necessary for compliance measures clearly describe an environment requiring an EM solution. There are many IT initiatives that mandate reporting and oversight. The constant flow of IAVA patches that must be deployed and reported not only presents a readiness question but creates a scenario where disaster recovery must be quick and efficient. The impact of a major virus outbreak could result in an unknown amount of damage. Without visibility and knowledge of networked assets the assessment of an information assurance emergency can not be readily obtained.

The measurement of EM ROI depends on knowing the IT inventory. Without a good inventory the quantitative ROI can be hard to determine. Until the full view of enterprise capabilities is established, the complete picture is not possible. This lack of visibility prohibits planning metrics and other proactive measures from being used. The ROI gained from proactive planning has many second and third order affects. The various levels of planning and execution from the MTF to the medical region and up to the MEDCOM are all positively impacted by having a clear understanding of IT assets. The increased information enabled by MEM will reduce data calls, provide insight, and foster timeliness in decision making.

The reduction of labor as a result of the MEM will produce a tangible ROI. Curtis and Scott (2003) estimate that by implementing enterprise service management and moving away from reactive management, labor costs can be reduced by 32 percent. The resource requirements of manual installations are significant. For example, the MHS deployment of the Composite

Health Care System II (CHCS II) is scheduled to take an average of 45 minutes to manually install each end user device. In June, 2005 A USAMITC SMS team of three administrators remotely deployed CHCS II to 196 end user devices at an average time of 20 minutes per device. The installations were concurrent with a total time of 45 minutes for the operation. The same operation done manually and subsequently would require 147 hours compared to the 2.25 hours needed for the MEM solution (USAMITC, 2005a). Cost savings for the MHS can be realized immediately if the current manual CHCS II installation plan is changed and a remote administration plan in implemented. The cost savings from automating CHCS II deployments would pay for the MEM plan several times over. The reduction of labor by centralizing expertise at one higher level, where software patches are remotely distributed, reduces the need for redundant staffs at each separate location. USAMITC (2005a) also describes Air Force testimony, before a congressional hearing on enterprise management, where centralized remote software administration saved 450 man hours per IAVA, per location.

The deployment of MEM has involved the incremental build up of a limited SMS deployment. Only two medical regions are connected to the SMS hierarchy, though neither region is fully participating in the SMS infrastructure. The remaining MEDCOM regions and agencies have either no EM solution or have an existing, non SMS, EM solution in place. Several of these sites have the ability to participate in the MEM but are declining to do so. Short of an official policy directing all MEDCOM agencies to participate in MEM, there will likely continue to be separate EM islands. Lacking a direct MEM policy, redundant costs and limited visibility of networked assets will be the MEDCOM standard.

The impediments to the progress of implementing MEM include several components that are not technically oriented but are more personality driven. Feedback expressed from certain

sites includes an unwillingness to let an outside agency, in this case USAMITC, have visibility of their hardware and software assets. EM is not something that is partially implemented. An organization the size of the MEDCOM either has a centralized EM plan or they have islands of EM with limited uniform standards and varying degrees of success. The centralized plan is less expensive and provides visibility with significant reporting capability, the decentralized plan is more expensive and creates barriers to reporting that in turn result in lower visibility. Some sites that have a current functioning EM solution have expressed a concern that changing the EM plan will result in a decrease in existing services. This is a legitimate concern and one that is addressed by USAMITC's MEM implementation team. A carefully coordinated MEM plan will ensure there are no disruptions or degradations in service.

IT perspectives should focus on more than individual medical regions and embrace a strategic vision of MEM. MEDCOM leaders of all levels should address MEM from an enterprise view and keep the big picture in mind. The perceived downsides to MEM can be addressed through careful planning and education. However, the best MEM plan will not occur unless there is a policy directly supporting its implementation. One of the keys to the success of MEM is for AMEDD leaders to understand the visibility and reporting abilities MEM will provide and how they can then in turn conserve local resources. MEM functions as an extension of the hospital's capabilities. The goal is not to remove control of IT functions from local commanders but to support and foster the ability of local commanders to provide patient care through a healthy robust network.

USAMITC has a history of success in implementing enterprise IT projects. The migration of the ccMail system to Microsoft® Exchange is an excellent example of a MEDCOM policy supporting and enabling the deployment of an IT enterprise system. The concerns by MEDCOM

agencies that a higher level agency was overlooking local operations as well as the possibility of decreased performance existed during the Microsoft® Exchange project. Both concerns were addressed and neither turned out to be a problem. The AD implementation is another EM success story. Mandated by the Army, USAMITC led the AD project for the MEDCOM, and to date the MEDCOM AD deployment is the largest DoD implementation of AD. Both the Exchange migration and the AD implementation were policy directed. These policies were essential to their success. The success of the MEM project is also dependent on the creation of a policy, without which MEM becomes an option. Current support for MEM indicates that as long as participation is an option MEM will continue to be only minimally supported.

Conclusions and Recommendations

MEM provides all levels of MEDCOM leadership the ability to proactively plan IT operations through establishing standards and improving visibility. MEM facilitates this visibility and planning through the IT functions of software distribution, asset management, system health monitoring, and the establishment of a centralized help desk. The ability to produce reports on the status of enterprise hardware and software and the subsequent planning that this enables not only curbs costs but it facilitates overall success and improved operations.

The utility of the results of the MEM study are significant. Understanding how MEM will support the IT goals of the AMEDD is important to leaders of all levels. Successful IT strategic planning is based on establishing priorities and then implementing IT where it is most practical (Bell and Lopez, 2003). The MEDCOM spends several hundred million dollars annually on IM/IT (MEDCOM, 2004). Much of this expense is due to the inability to proactively plan IM/IT operations on the enterprise level. This barrier to planning is a result of limited visibility of the hardware and software components of the enterprise.

The MEM project estimates that an investment of $14.6 million dollars will return a tangible ROI of $2.6 million dollars (USAMITC, 2005a). Additionally, the realized intangible ROIs are significant, these include the reduction of redundancies, establishment of improved efficiencies, expanded visibility, improved reporting capabilities, implementation of standards, and the removal of disparity between sites in helpdesk support. Shelton (2004) credits systems management software with cost reductions, labor savings, reduced backlogs, and faster customer response time. The implementation of MEM will support the MEDCOM's health care mission and enable leaders to quickly evaluate the enterprise IT posture and execute proactive IT solutions.

The goal of MEM is to create a computing environment that will facilitate the accomplishment of the strategic management goals and business processes of the MEDCOM by providing the visibility necessary to plan and control costs. When standardized and implemented, MEM results in increased visibility, efficiencies, and cost savings. The development of a MEM policy is vital to its successful deployment within the AMEDD. Paquet (2003) states that implementing EM without clear goals will result in failure. A MEM policy will clearly communicate the MEM goals and initiatives as well as ensure its success. The nature of implementing an enterprise solution results in strategic, tactical, organizational, and technological challenges. The most important factor in managing these is strong executive support followed by organizational change management. These have more to do with people and process and less to do with technology (Esteves-Sousa and Pastor-Collado, 2000). The commitment by AMEDD leaders of MEM as an IT vision is essential to the transition from groups of isolated MTFs to a coordinated IT enterprise that supports the strategic business needs of the MEDCOM.

Appendix

(AD) Active Directory

(AKO) Army Knowledge Online

(AMEDD) U.S. Army Medical Department

(ARPA) Advanced Research Projects Agency

(BCA) Business Case Analysis

(BSC) Balanced Score Card

(CERN) European Organization for Nuclear Research

(CHCS II) Composite Health Care System II

(DNS) Domain Name System

(DoD) Department of Defense

(ELA) Enterprise License Agreement

(EM) Enterprise Management

(IAVA) Information Assurance Vulnerability Assessment

(IM) Information Management

(IMGC) Information Management Guidance Counsel

(IM/IT) Information Management/Information Technology

(IMO) Information Management Officer

(IRR) Internal Rate of Return

(IT) Information Technology

(LAN) Local Area Network

(MEDCEN) Medical Center

(MEDCOM) U.S. Army Medical Command

(MEM) MEDCOM Enterprise Management

(MHS) Military Health System

(MOM) Microsoft Operations Manager

(MTF) Medical Treatment Facility

(NCP) Network Control Protocol

(NPV) Net Present Value

(NSFNET) National Science Foundation Network

(ROI) Return on Investment

(SA) System Administrator

(SMS) Systems Management Server

(TCO) Total Cost of Ownership

(TCP/IP) Transmission Control Protocol/Internet Protocol

(TIMPO) Tri-Service Infrastructure Management Program Office

(U.S.) United States

(WAN) Wide Area Networks

(WBEM) Web-Based Enterprise Management

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